CLAIMS

What is claimed is:

1. A method of providing a self-assembling monolayer on a surface, the method comprising the steps of: a) providing on the surface both latent reactive groups and a monolayer formed of self-assembling monolayer molecules, and b) activating the latent reactive groups under conditions suitable to either covalently attach the self-assembled monolayer to the surface and/or to form a stable monolayer film on the surface, by initiating polymerization of suitable groups provided by self-assembling monolayer molecules themselves and/or by forming intermolecular bonds between the self-assembling monolayer molecules.

2. A method according to claim 1 wherein the latent reactive groups are provided by the surface itself.

3. A method according to claim 1 wherein the SAM-forming molecules have themselves been provided with latent reactive groups.

4. A method according to claim 1 wherein the self-assembling monolayer molecules comprise amphiphilic molecules comprised of either: a) a hydrophobic domain which spontaneously associates with the surface from a polar solvent, and of a hydrophilic domain which allows the molecules to be dispersed in the polar solvent and which remains associated with the polar phase after monolayer formation on the surface, or b) a hydrophilic domain which spontaneously associates with the surface from a nonpolar solvent, and of a hydrophobic domain which allows the molecules to be dispersed in a nonpolar solvent and which remains associated with the nonpolar phase after monolayer formation on the surface.

5. A method according to claim 1 wherein the method is adapted for use with substantially flat or molded surfaces.

6. A method according to claim 5 wherein the surface is provided by a material selected from ceramics, metals and polymeric materials.

7. A method according to claim 5 wherein the surface is provided by a material selected from organosilane-pretreated glasses, organosilane-pretreated silicon materials, and silicon hydrides.

8. A method according to claim 6 wherein the material comprises a polymeric material selected from the group consisting of polystyrene, polycarbonate, polyester, polyethylene, polyethylene terephthalate (PET), polyglycolic acid (PGA), polyolefin, poly-(p-phenyleneterephthalamide), polyphosphazene, polypropylene, polytetrafluoroethylene, polyurethane, polyvinyl chloride, polyacrylate (including polymethacrylate), and silicone elastomers, as well as copolymers and combinations thereof.

9. A method according to claim 2 wherein the surface is coated with an intermediate coating adapted to provide latent reactive groups to the surface.

10. A method according to claim 9 wherein the surface comprises a ceramic, silicon oxide, metal oxide, or glass surface, and the intermediate layer comprises a photoreactive silane.

11. A method according to claim 1 wherein the material is provided in the form of a implantable biosensor.

12. A method according to claim 1 wherein the material is provided in the form of an implantable device having small pores.

13. A method according to claim 12 wherein the implantable device comprises a distal protection device for use in various vascular surgical procedures.

14. A method according to claim 1 wherein the latent reactive groups comprise photoreactive groups in the form of photoreactive aryl ketones.

15. A method according to claim 1 wherein the method comprises the steps of :

a) providing a support having a surface and a SAM composition, either or both of which are provided with suitable latent reactive groups, and

b) forming a coating of the SAM composition on the support surface, and covalently attaching the resultant coating to the support surface by simultaneously and/or sequentially activating the latent reactive groups.

16. A method according to claim 1 wherein the self-assembling monolayer molecules themselves provide thermochemical reactive groups and the method comprises the further step of attaching binding molecules to the monolayer by reaction between corresponding reactive groups of the binding molecules and the reactive groups of the self-assembling monolayer molecules.

17. A method according to claim 16 wherein the method comprises the steps of:

a) providing binding molecules having one or more corresponding thermochemical reactive groups and attaching the binding molecules to the self-assembling monolayer molecules via thermochemical interactions between their respective thermochemical reactive groups, and

b) coating the surface with the monolayer in order to provide an immobilized SAM having the binding molecules attached thereto.

18. A method according to claim 17 wherein the binding molecule is selected from the group consisting of coupling molecules and biological polymers, and the binding molecules are attached to the self-assembling monolayer molecules prior to coating and immobilizing the self-assembling monolayer.

19. A method of providing a self-assembling monolayer on a surface, the method comprising the steps of: a) providing on the surface both latent reactive groups and a monolayer formed of

self-assembling monolayer molecules, and b) activating the latent reactive groups under conditions suitable to covalently attach the self-assembled monolayer to the surface, wherein

a) the SAM-forming molecules have themselves been provided with latent reactive groups,

b) the self-assembling monolayer molecules comprise amphiphilic molecules comprised of a hydrophobic domain which spontaneously associates with the surface from an aqueous solution, and of a hydrophilic domain which allows the molecule to be dispersed in water and which remains associated with the aqueous phase after monolayer formation on the surface,

c) the surface is provided by a material selected from organosilane-pretreated glasses, organosilane-pretreated silicon materials, silicon hydrides, and polymeric materials, and

d) the latent reactive groups comprise photoreactive groups in the form of photoreactive aryl ketones.

20. A method according to claim 19 wherein the material comprises a polymeric material is selected from the group consisting of polystyrene, polycarbonate, polyester, polyethylene, polyethylene terephthalate (PET), polyglycolic acid (PGA), polyolefin, poly-(p-phenyleneterephthalamide), polyphosphazene, polypropylene, polytetrafluoroethylene, polyurethane, polyvinyl chloride, polyacrylate (including polymethacrylate), and silicone elastomers, as well as copolymers and combinations thereof.

21. A system adapted for use in performing the method of claim 1, the system comprising a surface in combination with latent reactive groups and a self-assembling monolayer molecules.

22. A material comprising a surface coated with a self- assembling monolayer according to the method of claim 1.

23. A method of using the material of claim 22, comprising the step of implanting the surface into a body to provide a passivating effect.

24. A composition comprising a self-assembling monolayer molecules derivatized with one or more latent reactive groups.

25. A composition according to claim 24 wherein the molecules are amphiphilic molecules that comprise hydrophobic and hydrophilic domains.

26. A composition according to claim 24 wherein the latent reactive groups comprise photoreactive aryl ketones attached to the hydrophobic domains.

27. A composition according to claim 24 wherein the latent reactive groups comprise photoreactive aryl ketones attached to the hydrophilic domains.

28. A composition according to claim 27 wherein the molecules are selected from the group consisting of linoleamide poly(ethylene glycol) and polyethers.